

Candidate Name	Centre Number	Candidate Number
		0



GCSE

185/10

**MATHEMATICS
HIGHER TIER
PAPER 2**

A.M. TUESDAY, 10 November 2009

2 hours

ADDITIONAL MATERIALS

A calculator will be required for this paper.

INSTRUCTIONS TO CANDIDATES

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** the questions in the spaces provided.

Take π as 3.14 or use the π button on your calculator.

INFORMATION FOR CANDIDATES

You should give details of your method of solution especially when a calculator is used.

Unless stated, diagrams are not drawn to scale.

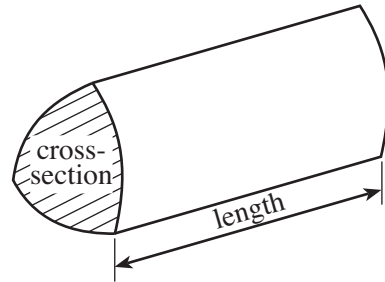
Scale drawing solutions will not be acceptable where you are asked to calculate.

The number of marks is given in brackets at the end of each question or part-question.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	9	
2	4	
3	8	
4	6	
5	5	
6	6	
7	8	
8	6	
9	5	
10	5	
11	8	
12	4	
13	3	
14	5	
15	5	
16	4	
17	4	
18	5	
TOTAL MARK		

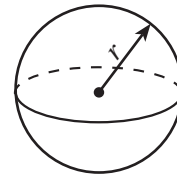
Formula List

Volume of prism = area of cross-section \times length



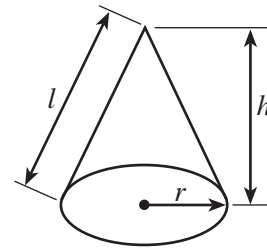
Volume of sphere = $\frac{4}{3} \pi r^3$

Surface area of sphere = $4\pi r^2$



Volume of cone = $\frac{1}{3} \pi r^2 h$

Curved surface area of cone = $\pi r l$

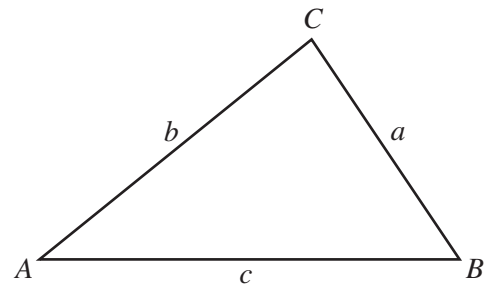


In any triangle ABC

Sine rule $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

Area of triangle = $\frac{1}{2} ab \sin C$



The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$

where $a \neq 0$ are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Standard Deviation

Standard deviation for a set of numbers

x_1, x_2, \dots, x_n , having a mean of \bar{x} is given by

$$s = \sqrt{\frac{\sum (x - \bar{x})^2}{n}} \quad \text{or} \quad s = \sqrt{\frac{\sum x^2}{n} - \left\{ \frac{\sum x}{n} \right\}^2}$$

1. (a) A jumper is priced at £35.
In a sale its price is reduced by 22%.
Find the sale price of the jumper.

.....

.....

.....

[3]

- (b) There are 25 left-handed people in a group of 40 people.
Find the percentage of the group who are left-handed.

.....

.....

[2]

- (c) The exchange rate is £1 = 1.15 euros.

- (i) A holiday is advertised for 345 euros.
How much is the holiday in pounds?

.....

.....

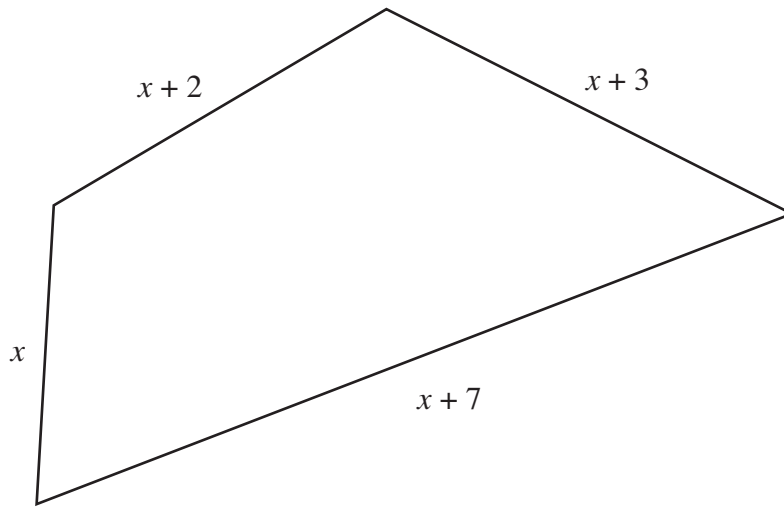
- (ii) At the airport a pair of sunglasses is priced at £24.
A sign says that it is possible to pay in euros.
How much are the sunglasses in euros?

.....

.....

[4]

2. The diagram shows a quadrilateral.
The lengths of the sides are all given in centimetres.



- (a) Write an expression for the perimeter of the quadrilateral in terms of x .

.....
[1]

- (b) (i) The perimeter of the quadrilateral is 40 cm.
Write down an equation in terms of x .

-
(ii) Solve the equation.
.....
.....

[2]

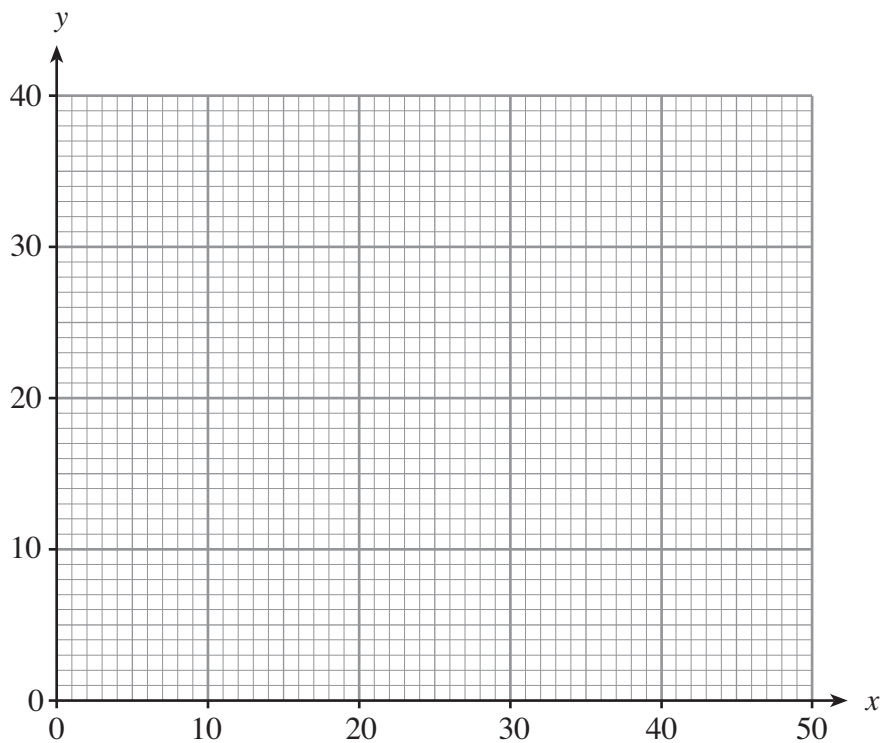
- (c) Write down the lengths of the four sides of the quadrilateral.

.....
[1]

3. In a science experiment, values of x and y are recorded to look for a relationship. The table below shows the results.

x	20	50	10	40	30
y	8	30	4	24	14

- (a) On the grid below, draw a scatter diagram to show these results.



[2]

- (b) The mean of the x values is 30.

- (i) Calculate the mean of the y values.

.....

.....

- (ii) Draw the line of best fit on your scatter diagram.

[4]

- (c) Which type of correlation does your scatter diagram show?

.....

[1]

- (d) Write down an approximate value for y when x is 35.

.....

[1]

4. (a) Keith says that the sum of two different square numbers is always odd.
Give an example to show that Keith is wrong.

.....
..... [2]

- (b) Janice says that prime numbers are always odd.
Explain why she is wrong.

.....
..... [1]

- (c) The sum of five consecutive numbers is 125.
Find the five numbers.

.....
.....
.....
.....
..... [2]

- (d) The product of two numbers is 77.
The sum of the two numbers is 18.
Find the two numbers.

.....
.....
..... [1]

5. (a) Write down the n th term of the sequence 9, 17, 25, 33, 41,

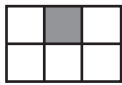
.....

.....

.....

[2]

- (b) The diagrams show tile patterns.
Each pattern has some shaded tiles and some white tiles.



Pattern 1



Pattern 2



Pattern 3



Pattern 4

- (i) Find an expression for the number of shaded tiles in Pattern n .

.....

- (ii) Find an expression for the number of white tiles in Pattern n .

.....

.....

.....

.....

.....

[3]

6. A supermarket collects information about varieties of apples. The information is shown in the table below.

	Mean weight	Modal weight	Median weight	Range
Royal Gala Apple	108 g	105 g	106 g	13 g
Pink Lady Apple	112 g	105 g	104 g	24 g

- (a) A counter display is made using 100 apples. Calculate the approximate mean weight of these 100 apples, given that there are 60 Royal Gala apples and 40 Pink Lady apples.
You must show all your working.

.....

.....

.....

.....

.....

.....

.....

.....

[4]

- (b) To create a display in the entrance hall of the supermarket, one of these varieties of apple is selected. The supermarket wants all the apples it sells to be roughly the same size. Which variety of apple should the supermarket select for the display? You must give a reason for your answer.

.....

.....

.....

.....

.....

[2]

7. (a)

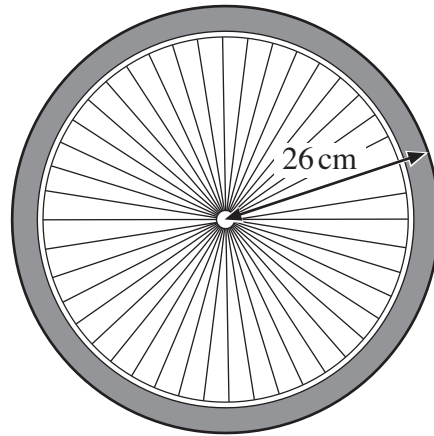


Diagram not drawn to scale.

A wheel, including the tyre, has a radius of 26 cm. How many complete revolutions will the wheel make in travelling 1 km?

.....

.....

.....

.....

.....

.....

.....

.....

.....

[5]

(b) A cyclist travels 28 miles in 1 hour 45 minutes, find her average speed in m.p.h.

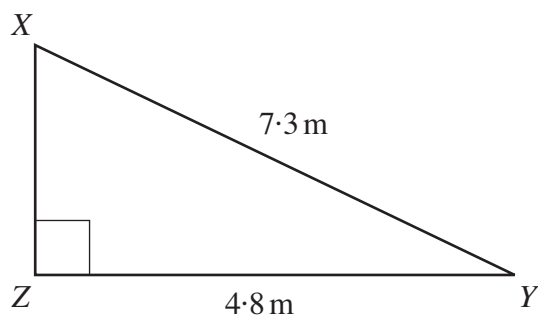
.....

.....

.....

[3]

8. (a)

*Diagram not drawn to scale.*

XYZ is a right-angled triangle in which $XY = 7.3$ m and $ZY = 4.8$ m. Calculate the length of XZ .

.....

.....

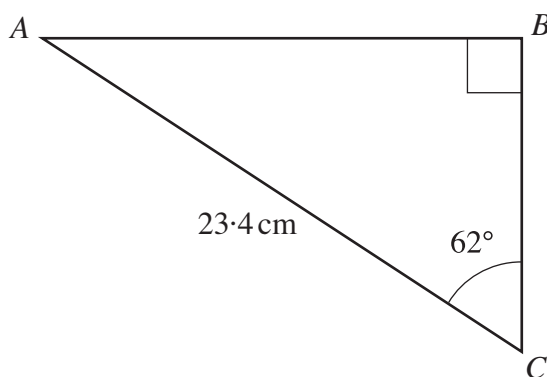
.....

.....

.....

[3]

(b)

*Diagram not drawn to scale.*

ABC is a right-angled triangle with $AC = 23.4$ cm and $\widehat{ACB} = 62^\circ$. Calculate the length of BC .

.....

.....

.....

.....

.....

[3]

11. (a) Make w the subject of the formula $8(w - 3y) = 3(w + 2y)$.

.....
.....
.....
.....

[3]

- (b) Factorise $x^2 - 7x + 10$.

.....
.....

[2]

- (c) Solve the inequality $45 + y < 7y - 3$.
Write your answer in the form $y > a$ where a is a whole number.

.....
.....
.....
.....

$$y > \dots\dots\dots$$

[3]

14. (a)

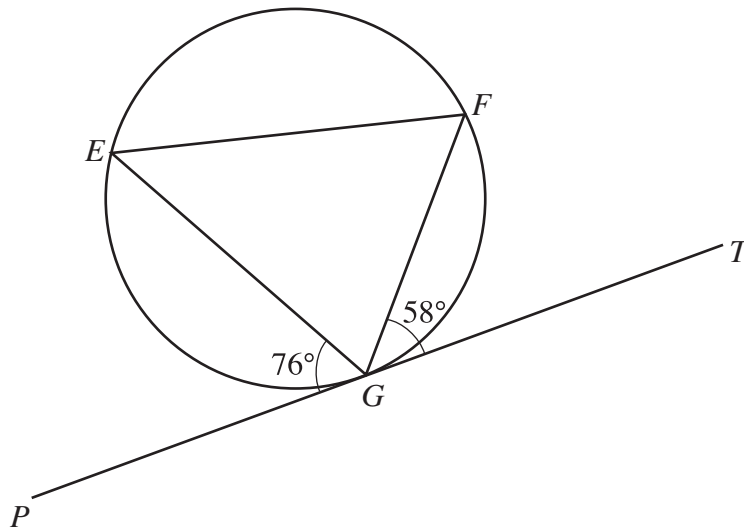


Diagram not drawn to scale.

Three points E , F and G lie on the circumference of the circle.

The tangent PT touches the circle at G .

Given that $\widehat{EGP} = 76^\circ$ and $\widehat{FGT} = 58^\circ$, find the size of \widehat{FEG} , giving a reason for your answer.

.....

.....

.....

.....

[2]

(b) Given that y varies inversely as x , and $y = 0.3$ when $x = 10$, find the relationship between x and y .

.....

.....

.....

[3]

15. The diagram shows triangle ABC .

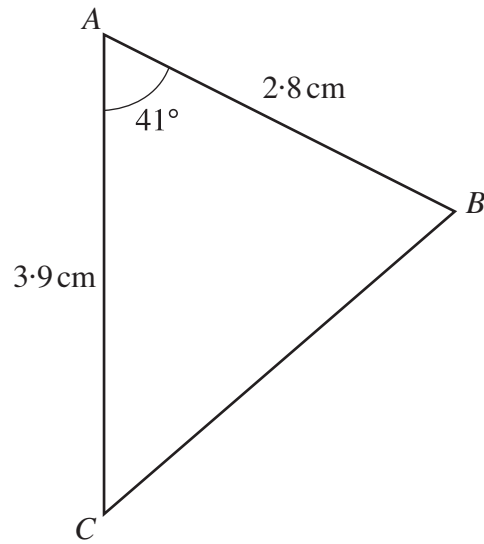


Diagram not drawn to scale.

Given that $\hat{BAC} = 41^\circ$, $AB = 2.8$ cm and $AC = 3.9$ cm calculate

(a) the area of the triangle,

.....

.....

.....

.....

[2]

(b) the length BC .

.....

.....

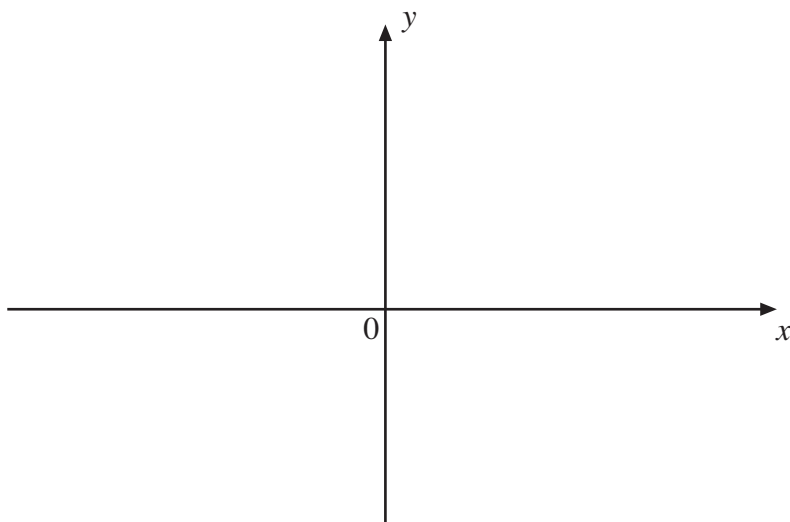
.....

.....

[3]

16. (a) Using the axes below, **sketch** the graph of $y = \cos x$ for values of x from -180° to 180° .

[2]



- (b) Find **all** solutions of the following equation in the range -180° to 180° .

$$\cos x = -0.19$$

.....

.....

.....

.....

.....

[2]

17. The volume of a **hemisphere** is 48.5 cm^3 . Calculate the radius of the **hemisphere**.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

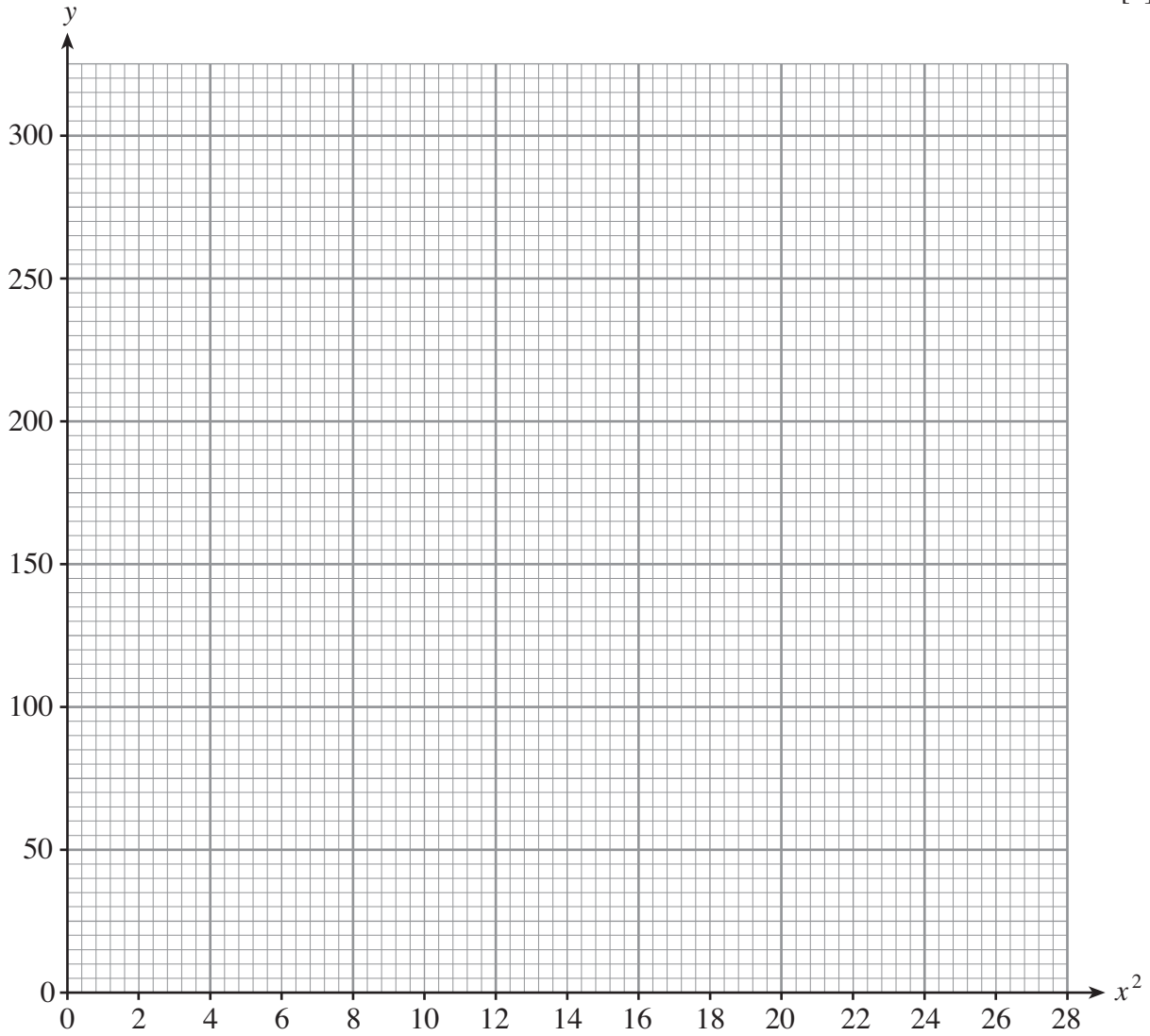
[4]

18. The data in the table was recorded during an experiment. Results were recorded for the two variables x and y .

x	1	2	3	4	5
y	80	100	140	200	270

- (a) On the graph paper plot the values of y against the values of x^2 .

[2]



- (b) It is known that y is approximately equal to $ax^2 + b$. Use your graph to estimate the values of a and b .

.....

.....

.....

.....

.....

.....

.....

[3]